

Exhibit A

AHMED H. TEWFIK

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Austin, TX 78746
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Education

Sept. 1984 to Feb.
1987

Sc.D. in Electrical Engineering and Computer Science, conferred in February 1987, M.I.T, Cambridge, MA. Thesis under Prof. B. C. Levy and Prof. A. S. Willsky on "State-Space Estimation and Spectral Estimation for 2-D Isotropic Random Fields".
E.E. degree conferred in February 1985.

Sept. 1982 to May
1984

S.M. degree in Electrical Engineering and Computer Science. M.I.T, Cambridge, MA. Thesis under Prof. J. H. Shapiro on "Range-Spread Speckle Target Effects on CW Coherent Laser Radar Range Measurements".

Sept. 1977 to June
1982

B.S. in Electrical Engineering and Computer Science. Cairo University, Cairo, Egypt. Thesis on "Computer Chess Player"

Employment:

Oct. 2010 to
present

Cockrell Family Regents Chair in Engineering and Chairman, Department of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX

- Led faculty to hire award winning assistant professors that went on to win Sloan Fellowships, Packard Fellowships, Intel faculty awards, Google faculty awards, NSF Career awards, etc.
- Increased faculty participation in departmental operations and vision through implementation of an extended faculty governance system and weekly faculty meetings
- Identified and implementing new strategies for generating external income for the department through corporate relations and professional education programs.
- Reorganized the department and retargeted its resources towards the direct support of its educational mission
- Led the development of new educational programs, including a

combined bachelor's/master's degree, a professional master's degree and first ever MOOC class with a physical laboratory

- Redesigned senior design course and turned it into a mostly industry sponsored course, currently extending the model to an interdisciplinary college wide senior design course,
- Built a research support office to assist the faculty in seeking external funding
- Conceived and raising funds for an underprivileged and underrepresented student outreach and academic preparation program
- Conceived and implementing large scale strategic academia-industry and academia-government research partnerships in areas of potential high economic and societal impact
- Devised large inter-disciplinary research thrusts and assemble teams of researchers from multiple institutions to secure funding for their development and conduct research program
- Established a new top undergraduate admits recruiting program
- Conceived and implementing student internship program with early stage start-ups
- Seminal contributions to key areas in signal and information processing and communications
- Technical achievements recognized by peers in industry and academia

Sept. 1987 to
Sept. 2010 (on
leave 1997-2001)

E. F. Johnson Professor of Electronic Communications, (July 1996-Present, on leave 1998-2001), E. F. Johnson Associate Professor of Electronic Communications, (Sept. 1993-June 1996), Associate Professor (July 1992-August 1993), Assistant Professor (Sept. 1987-June 1992) Department of Electrical Eng., University Of Minnesota, Minneapolis, MN.

- Consistent ability to select promising technologies and secure funding for their development
- Seminal contributions to key areas in signal and information processing and communications
- Technical achievements recognized by peers in industry and academia
- Pioneering with Carlson School of Business new sources of research funding and integrated student training through collaboration with seed stage start-ups

August 1997 to
August 2001

Founder and CEO. Cognicity, Inc., Edina, MN.

- Strong implementation skills to turn a vision into productive reality
- Drive organization to greater productivity, efficiency, quality and profitability
- Track record of cost reduction
- Excellent presentation skills and ability to handle media and

analysts

- Can-do team leadership with vision and perseverance
- Maintain focus, productivity and employee retention during transition and difficult periods
- Routinely secured key initial revenue generating contracts
- Conceived and assembled strategic partnerships to enhance revenue generation

Jan. 1987 to May
1987

Lecturer. M.I.T, Cambridge, MA.

March 1987 to
Aug. 1987

Systems Engineer. Alphatech, Inc., Burlington, Mass.

Consulting

2012

Matthews and Lawson, Houston, TX

2009

Jardine, Logan & O'Brien, Lake Elmo, MN

2008

St. Jude Medical, Minnetonka, MN

2006-2007

Transoma Medical, Arden Hills, MN

2006- 2007

Keyeye Communications, Sacramento, CA

2001-2005

Visionaire, Fremont, CA

2003

CyberNova, Milipitas, CA

2004

Macrovision, Santa Clara, CA

2004

Ipsos, New York

2001-2002

Digimarc, Tualatin, OR

1995

MTS Systems, Inc., Eden Prairie, MN

1989-2001

Emerson-Rosemount, Inc., Eden Prairie, MN

Honors and Awards:

Plenary Speaker, IEEE-Cairo University Cairo International Biomedical Engineering Conference, Cairo, Egypt, December 2012.

Plenary Speaker, IEEE Workshop on Signal Processing Systems, Beirut, Lebanon, October 2011.

Elected VP Technical Directions, IEEE Signal Processing Society, 2009.

Plenary Speaker, IEEE Int. Symposium on Signals, Circuits and Systems, Iasi, Romania, July 2007.

Plenary Speaker, Cairo International Biomedical Engineering Conference, Cairo, Egypt, December 2006.

Elected to Board of Governors, IEEE Signal Processing Society, 2005.

Plenary Speaker, SampTA05: Sampling Theory and Applications, 2005, Samsun, Turkey, July 2005.

Plenary Speaker, 10th IEEE International Conference on Electronics, Circuits and Systems (ICECS 2003), Sharjah, U.A.E., December 2003.

Plenary Speaker, Transmitting, Processing And Watermarking Multimedia Contents, 4th EU Cost 276 Workshop, Information and Knowledge Management for Integrated Media Communication, Bordeaux, France, March 2003.

Plenary Speaker, NRSC 2002, 19th National IEEE/URSI Radio Science Conference, Alexandria, Egypt, March 2002.

Plenary Speaker, SSRR2002w International Conference on Advances in Infrastructure for Electronic Business, Science, and Education on the Internet, L'Aquila, Italy, January 2002.

Plenary Speaker, 2001 IEEE Int. Symp. On Signal Proc. And Info. Theory, Cairo, Egypt, December 2001.

IEEE Third Millennium Award, 2000.

Plenary Speaker, 1999 IEEE-EURASIP Workshop on Nonlinear Signal and Image Processing, Antalya, Turkey, June 1999.

Plenary Speaker, 1999 SIU'99, Bilkent University, Ankara, Turkey, June 1999.

Distinguished Lecturer of the IEEE, Signal Processing Society, 1997.

Fellow IEEE, 1996.

Plenary Speaker, 1994 IEEE Conf. on Acoust. Speech and Signal Proc., Adelaide, Australia, April 1994.

Keynote speaker, 15th Annual Int. Conf. of the IEEE EMBS, Oct. 1993.

E. F. Johnson Professorship in Electronic Communications, University of Minnesota, 1993.

Taylor Career Development Award, University of Minnesota, 1992.

NSF Engineering Research Initiation Award, 1990.

Best Student Award, Cairo University, 1979.

Graduate Thesis Supervised:

A. M.Sc. Students:

1. Afshin Amini, Report on “Random Field Models for Edge Detection”, March 1989.
2. Anthony Winkelmann, Thesis on “ An Application of Probabilistic Relaxation Labeling as a Post Processor for Hidden Markov Model Based Texture Segmentation,” May 1990.
3. Hichem Garnaoui, Thesis on “Multigrid Techniques in Image Reconstruction”, August 1990.
4. Grant S. Christiansen, Report on “Phase Noise Analysis of Magnetic Recording Systems,” May 1991.
5. Shahzad Kirmani, Thesis on a “Study of the Effects of Surface Microstructure on Coherent Illumination and Related Speckle Phenomena,” December 1991.
6. Paul Jorgensen, Report on a “Choosing Discrete Orthogonal Wavelets for Signal Approximation and Analysis,” March 1992.
7. Murataza Ali, Thesis on “Multiscale Difference Equations in M-D Signal Modeling”, May 1992.
8. Deok-Geun Kwon, Report on “the JPEG Image Coding Standard,” April 1993.
9. Yucheng Huang, Report on “Flow Effects in Magnetic Resonance Imaging,” June 1993.
10. Bin Zhu, Report on “Human Vision Models and Their Applications in Image Coding”, October 1993.
11. Yuying Chao, Report “Sensitivity of Wavelet Coding Schemes,” July 1994.
12. Mitchell Swanson, Thesis on “Binary Wavelet Decompositions of Binary Images,” Feb. 1995.
13. Sophie Olsson, Report on “Video Coding for Interactive Multimedia Applications,” May 1995.

14. Tse Hua Lan, Report on "Small Vocabulary Continuous Speech Recognition Using Syllabic Sub-Word Unit in Hidden Markov Models," September 1995.
15. Keesook Han, Thesis on "Vision Based Crab Recognition Systems," November 1995.
16. Jeho Nam, Thesis on "Combined Audio and Visual Streams Analysis for Video Sequence Segmentation," December 1996.
17. Hisham Mohamed, Report on "Laser Tomographical Reconstruction of Teeth", April 1997.
18. Heath Hoglund, Report on "Phoneme Based Vocoding", June 1997.
19. Nicolas Sieger, Report on "Audio Coding for MIDI", October 1997.
20. Photios Papaphotios, Report on "Internet Security", March 1998.
21. Danlu Zhang, Report on "Acoustic Emission Transient Detection and Classification", July 1998.
22. Paul Krause, Report on "Detection of Blood Perfusion", January 1999.
23. Abdel Hamid Lawabni, Report on "Multimedia Distribution", June 2001.
24. Changjin Hong, Report on "ISCSI and Fibre Channel Storage Area Networks", October 2003.
25. Yuan Zhao, Report on "Collision Resolution of Pseudocellular WLANs with Beamforming", December 2003.
26. Alain Tchagang, Report on "Genomic Signal Processing: New Schemes for DNA Analysis", September 2004.
27. Fakhrul Zaman Rokhani, "Energy Efficient Techniques in WLAN 802.11b", October 2004.
28. Seshan Srirangarajan, "Localization in Wireless Sensor Networks in Non-Line of Sight Environments," April 2005.
29. Rob Martinson, "Detection of Sleep Apnea from Heart Rate Variability using the Discrete Wavelet Transform," May 2005.
30. Amer Agovic, "Protein Folding From A Signal Processing Perspective," October 2005.

31. Ammar Alastad, "Enhanced-MSE-OFDM: A New OFDM Transmission Technique with Improved System Performance," December 2005.
32. Jose F. (Pepe) Barbe, "Co-Regulation Discovery Using Support Vector Machines And Heterogeneous Data," Oct. 2006.
33. Mithun Mallappa Gundi, Thesis on "Ambulatory Device For Recording Urological Response to Intense Physical Activity of Division I Collegiate Female Athletes," December 2007.
34. Vasili Zhdankin, Thesis on "Medial Axis Analysis and Structural Characterization of Three-Dimensional Porous Structures," April 2008.
35. Sheldon Struthers, Thesis on "A Simple Bit Correlator Based Algorithm to Improve the Detectability and Decodability Of Weak, Repeated Burst-Modem BPSK Signals In AWGN", July 2008.

B. Ph.D. Students:

1. Wooyoung Hong, Thesis on "Array Signal Processing and Spatial Spectral Estimation Using Data Transformation", Sept. 1991.
2. Myoungjin Kim, Thesis on "Multiscale Techniques in Detection and Estimation", Nov. 1991.
3. Mohamed Deriche, Thesis on "Filtered Fractionally Differenced Processes and Their Applications in Signal Processing", Nov. 1991.
4. Zhe Wu, Thesis on "Multigrid Approaches to Phase Retrieval", May 1992.
5. Deepen Sinha, Thesis on "Adaptive High Quality Wavelet Encoding of Audio Signals," Feb. 1993.
6. Hehong Zou, Thesis on "Generalized Wavelet Representations," April 1993.
7. Hichem Garnaoui, Thesis on "Novel Approaches for Magnetic Resonance Imaging", July 1994.
8. Murtaza Ali, Thesis on "Adaptive Signal Representation with Application in Audio Coding", Oct. 1995.
9. Srinath Hosur, Thesis on "Recursive Matrix Factorization Algorithms in Adaptive Filtering and Mobile Communications", Oct. 1995.

10. Sameh Sowelam, Thesis on “Optimal Sequential Waveform Selection For Radar Target Imaging and Classification”, Feb. 1997.
11. Mitchell Swanson, Thesis on “Issues in Multimedia Databases: Coding for Content-Based Image Retrieval and Digital Copyright Protection”, March 1997.
12. Bin Zhu, Thesis on “Coding and Data Hiding for Multimedia”, July 1997.
13. Mohammed Nafie, Thesis on “Low Complexity Signal Representation and Demodulation Techniques”, June 1999.
14. Tse Hua Lan, Thesis on “Wireless Multimedia Distribution”, September 1999.
15. Khaled Hamdy, Thesis on “Audio Modeling for Coding and Time-Scaling Applications”, November 1999.
16. Jeho Nam, Thesis on “Video Characterization”, July 2000.
17. C. H. Kuo, Thesis on “Image Segmentation”, January 2001.
18. Masoud Alghoneimy, Thesis on “Multimedia Distribution”, January 2001.
19. Ayman Abdel Samad, Thesis on “Search Strategies for Radar Target Localization”, February 2001.
20. Keesook J. Han, Thesis on “Video Analysis,” October 2001.
21. Mohamed Mansour, Thesis on “Algorithms for Digital Watermarking”, December 2002.
22. Marie Guion, Thesis on “Computerized Heart Valve Diagnosis using a Digitized Heart Sound”, December 2003.
23. Yeonjoon Chung, Thesis on “A Study of Video Streaming Delivery Protocols for Efficient Video-on-Demand Services,” December 2003.
24. Ebrahim Saberinia, Thesis on “Multi-carrier Ultra Wideband Communication Systems,” June 2004.
25. Yahya Al-Harhi, Thesis on “Opportunistic Scheduling and Adaptive Modulation in Wireless Communications,” November 2005.
26. Osama Abu Sharkh, Thesis on “Performance Evaluation and Enhancement of the MAC Layer for Multi-rate SISO and MIMO IEEE 802.11 Wireless LANs,” June 2006.

27. Alain Tchagang, Thesis on “Novel Techniques for Early Detection of Ovarian Carcinoma,” July 2007.
28. Syed Faisal Shah, Thesis on “Design of Low Complexity OFDM Schemes and Position Location Algorithm for Wireless Systems,” January 2008.
29. Changjin Hong, Thesis on “Efficient Updating of Dynamic Programming Based Biological Sequence Analysis,” July 2008.
30. Seshan Srirangarajan, Thesis on “Ranging and Positioning in Wireless Sensor Networks,” July 2008.
31. Jonathan D. Coker, Thesis on “Signal Processing Algorithms for Simplified-Hardware Multistatic Synthetic Aperture Radar,” September 2008.
32. Abhilash Patangay, Thesis on “Heart Sounds Based Monitoring,” Feb. 2009.
33. Abdullah Alqallaf, Thesis on “Signal Processing Techniques and Statistics for the Analysis of the Human Genome,” April 2009.
34. B. Vikram Gowreesunker, Thesis on “Sparse Decomposition Methods for Multi-Channel Signals,” July 2009.
35. Baharan Kamousi, “Detection and Classification of Cardiac Arrhythmias,” September 2009.
36. F. Goksu, Thesis on “Time Frequency and Spatial Feature Generation for Food Kernel Inspection and Brain Computer Interface,” September 2010.
37. Dan Wang, Thesis on “Real-time 3D Visualization of Organ Deformations Based on Structured Dictionary,” February 2012.
38. Nikhil Kundargi, Thesis on “Novel Channel Sensing and Access Strategies in Opportunistic Spectrum Access Networks,” March 2012.
39. Yingxi Liu, Thesis on “Beyond White Space: Robust Spectrum Sensing and Channel Statistics Based Spectrum Accessing Strategies for Cognitive Radio Networks,” June 2013.

Patents

1. “Process Control Transmitter,” R. L. Frick, A. H. Tewfik and J. P. Schulte, US Patent Document no. 5,705,978, Jan. 1998.

2. "Image/Documentation Management System for Content-Based Retrieval," M. Swanson, A. H. Tewfik and S. Hosur, US Patent Document no. 5,987,459, Nov. 1999.
3. "Method and apparatus for embedding data, including watermarks, in human perceptible images," A. H. Tewfik, M. D. Swanson and B. Zhu, US Patent Document no. 6,031,914, February 2000.
4. "Method and apparatus for embedding data, including watermarks, in human perceptible sounds," A. H. Tewfik, M. D. Swanson, B. Zhu and L. Boney, US Patent Document no. 6,061,793, May 2000.
5. "Method and apparatus for scene-based video watermarking," A. H. Tewfik, M. D. Swanson, B. Zhu and L. Boney, US Patent Document no. 6,226,387, May 2001.
6. "Digital watermarking to resolve multiple claims of ownership," A. H. Tewfik, M. D. Swanson and B. Zhu, US Patent Document no. 6,272,634, August 2001.
7. "Method and apparatus for video watermarking using perceptual masks," A. H. Tewfik, M. D. Swanson and B. Zhu, US Patent Document no. 6,282,299, August 2001.
8. "Multimedia data embedding," A. H. Tewfik, M. D. Swanson and B. Zhu, US Patent Document no. 6,442,283, August 2002.
9. "Process transmitter with orthogonal-polynomial fitting," L. Kleven and A. H. Tewfik, US Patent Document no. 6,643,610, Nov. 2003.
10. "Digital watermark detecting with weighting functions," A. H. Tewfik, M. D. Swanson and B. Zhu, US Patent Document no. 6,751,337, June 15, 2004.
11. "Transactional watermarking," A. H. Tewfik, M. D. Swanson and B. Zhu, US Patent Document no. 6,915,481, July 2005.
12. "High speed wireless sensor, server and storage networks," A. H. Tewfik, US Patent Document no. 7,099,654, August 2006.
13. "Analysis of auscultatory sounds using single value decomposition," M. A. Guion, A. G. Erdman; G. Sommerfeld; A. H. Tewfik and C. D. Oster, US Patent Document no. 7,300,405, November 2007.
14. "Digital watermarking with content dependent keys and autocorrelation properties for synchronization," A. H. Tewfik, US Patent Document no. 7,366,908, April 2008.
15. "Digital watermarking of tonal and non-tonal components of media signals," A. H. Tewfik, M. D. Swanson and B. Zhu, US Patent Document no. 7,454,034, November

2008.

16. "Enhanced time resolution using multiple receptions," A. H. Tewfik and E. Saberinia, US Patent Document no. 7,489,665, February 2009.
17. "Embedding data in and detecting embedded data from video objects," A. H. Tewfik, US Patent Document no. 8,098,637, January 2012.
18. "Load balancing in wireless local area networks," A. H. Tewfik, B. Zhu and M. D. Swanson, US Patent Document no. 8,090,142, January 2012.
19. "Multimedia data embedding and decoding," A. H. Tewfik, M. D. Swanson and B. Zhu, US Patent Document no. 8,103,051, January 2012.
20. "Watermarking using multiple watermarks and keys, including keys dependent on the host signal," A. H. Tewfik, B. Zhu and M. D. Swanson, US Patent Document no. 8,131,007, March 2012.
21. "Ranging in multi-band communication systems," A. H. Tewfik and E. Saberinia, US Patent Document no. 8,149,961, April 2012.
22. "Video watermarking using temporal analysis," A. H. Tewfik, B. Zhu and M. D. Swanson, US Patent Document no. 8,155,375, April 2012.
23. "Embedding data in audio and detecting embedded data in audio," A. H. Tewfik, B. Zhu and M. D. Swanson, US Patent Document no. 8,306,811, November 2012.

Book Chapters

1. "Multiscale Signal Modeling and Processing: Filtered Fractals and Wavelet Analysis in Signal Detection, Estimation and Synthesis" A. H. Tewfik, in *Handbook of Statistics Volume 10: Signal Processing and Its Applications*, N. K. Bose and C. R. Rao, Eds., North-Holland Publishing Co., 1993.
2. "Multiple Subspace ULV Algorithm and LMS Tracking," S. Hosur, A. H. Tewfik and D. Boley, in *3rd Int'l Workshop on SVD and Signal Processing*, M. Moonen and B. De Moor, Eds., Leuven, Belgium: Elsevier, 1995.
3. "Issues In Multimedia Databases: Coding For Content-Based Image Retrieval And Digital Copyright Protection," M. D. Swanson and A. H. Tewfik, in *The Mathematics of Information Coding, Extraction and Distribution*, G. Cybenko, D. O'Leary and J. Rissanen, Eds., Springer-Verlag, 1998.
4. "Multiresolution and Object Based Video Watermarking Using Perceptual Models," in *Wavelet, Subband And Block Transforms In Communications And Multimedia*, Ali N.

Akansu and Michael J. Medley, Eds., Kluwer Academic Publishers, 1998.

5. "Vulnerability of Multimedia Protection Schemes," A. H. Tewfik and M. Mansour, in *Multimedia Security*, B. Furht and D. Kirovski, Eds, CRC Press, 2004.
6. "Multicarrier and Multirate Techniques in UWB System Design and Implementation," E. Saberinia and A. H. Tewfik, in *Ultra Wideband Wireless Communications*, H. Arslan, Z. -N. Chen and M. -G. Di Benedetto, Eds, John Wiley & Sons, Inc., 2006.
7. "ECoG Based Brain Computer Interface with Subset Selection," N. F. Ince, F. Goksu and A. H. Tewfik, in *Biomedical Engineering Systems and Technologies*, A. Fred, H. Gamboa and J. Filipe, Eds, Springer Berlin Heidelberg, 2008.

Journal Publications:

1. "An Eigenstructure Approach for the Retrieval of Cylindrical Harmonics from 2-D Isotropic Covariance Data," A. H. Tewfik, B. C. Levy and A. S. Willsky, *Signal Processing*, vol. 13, no. 2, pp. 121-139, Sept. 1987.
2. "An Efficient Maximum Entropy Technique for 2-D Isotropic Random Fields," A. H. Tewfik, B. C. Levy and A. S. Willsky, *IEEE Trans. Acoust. Speech and Signal Proc.*, vol. ASSP-36, no. 5, pp. 797-812, May 1988.
3. "Sampling Theorems for 2-D Isotropic Random Fields," A. H. Tewfik, B. C. Levy and A. S. Willsky, *IEEE Trans. on Inform. Theory*, vol. IT-34, no. 5, pp. 1092-1096, Sept. 1988.
4. "Reconstruction of Finite 1-D Objects from Long and Short Exposure Images," A. H. Tewfik, *Journal of the Optical Soc. of America A*, vol. 7, no. 2, pp. 318-322, Feb. 1990.
5. "Parallel Smoothing," A. H. Tewfik, B. C. Levy and A. S. Willsky, *Systems and Control Lett.*, vol. 14, no. 3, pp. 253-259, March 1990.
6. "Internal Models and Recursive Estimation for 2-D Isotropic Random Fields," A. H. Tewfik, B. C. Levy and A. S. Willsky, *IEEE Trans. on Inform. Theory*, vol. 37, no. 4, pp. 1055-1066, July 1991.
7. "Multigrid Implementation of a Hypothesis Testing Approach to Blur Identification and Image Reconstruction" A. H. Tewfik and H. Garnaoui, *Journal of the Optical Soc. of America A*, vol. 8, no. 7, pp. 1026-1037, July 1991.
8. "Direction Finding in the Presence of Colored Noise by Candidate Identification," A. H. Tewfik, *IEEE Trans. on Signal Proc.*, vol. 39, no. 9, pp. 1933-1942, September 1991.

9. "Correlation Structure of the Discrete Wavelet Coefficients of Fractional Brownian Motions," A. H. Tewfik and M. Kim, *IEEE Trans. on Inform. Theory*, vol. 38, no. 2, part 2, pp. 904-909, March 1992.
10. "On the Application of Uniform Linear Array Bearing Estimation Techniques to Uniform Circular Arrays," A. H. Tewfik and W. Hong, *IEEE Trans. on Signal Proc.*, vol. 40, no. 4, pp. 1008-1011, April 1992.
11. "On the Optimal Choice of a Wavelet for Signal Representation," A. H. Tewfik, D. Sinha and P. E. Jorgensen, *IEEE Trans. on Inform. Theory*, vol. 38, no. 2, part 2, pp. 747-767, March 1992.
12. "Parametrization of Compactly Supported Orthonormal Wavelets," H. Zou and A. H. Tewfik, *IEEE Trans. on Signal Proc.*, vol. 41, no. 3, pp. 1428-1431, March 1993.
13. "An SVD Approach to Edge Detection," A. H. Tewfik and M. Deriche, *IEEE Trans. on Image Proc.*, vol. 2, no. 3, pp. 353-368, July 1993.
14. "Signal Modeling with Filtered Discrete Fractional Noise Processes," M. Deriche and A. H. Tewfik, *IEEE Trans. on Signal Proc.*, vol. 41, no. 9, pp. 2839-2849, Sept. 1993.
15. "Maximum Likelihood Estimation of the Parameters of Discrete Fractional Gaussian Noise Processes," M. Deriche and A. H. Tewfik, *IEEE Trans. on Signal Proc.*, vol. 41, no. 10, pp. 2977-2989, Oct. 1993.
16. "Low Bit Rate Transparent Audio Compression Using Adapted Wavelets," D. Sinha and A. H. Tewfik, *IEEE Trans. on Signal Proc.*, vol. 41, no. 12, pp. 3463-3479, Dec. 1993.
17. "Fast Multiscale Statistical Signal Processing Algorithms," A. H. Tewfik and M.-Y. Kim, *IEEE Trans. on Signal Proc.*, vol. 42, no. 3, pp. 572-585, March 1994.
18. "Recent Progress in the Application of Wavelets in Surveillance Systems," A. H. Tewfik, S. Hosur and S. Sowelam, invited paper, *Optical Engineering*, vol. 33, no. 8, pp. 2509-2519, August 1994.
19. "Multiscale Difference Equation Signal Models: Part I Theory," M. Ali and A. H. Tewfik, *IEEE Trans. on Signal Proc.*, vol. 43, no. 10, p. 2332-2345, Oct. 1995.
20. "Time Delay Estimation Using Wavelet Transform for PW Ultrasound," X.-L. Xu, A. H. Tewfik and J. F. Greenleaf, *Annals of Biomedical Engineering*, vol. 23, pp. 612-621, 1995.

21. "Completeness and Stability of Partial Wavelet Domain Signal Representations" A. H. Tewfik and H. Zou, *IEEE Trans. on Signal Proc.*, vol. 43, no. 11, pp. 2570-2581, Nov. 1995.
22. "Efficient design of Ultrasound True-Velocity Flow Mapping," Y. M. Kadah and A. H. Tewfik, *IEEE EMB Mag.*, vol. 15, no. 5, pp. 118-125, Sep-Oct 1996.
23. "Binary Wavelet Decomposition of Binary Images," M. Swanson and A. H. Tewfik, *IEEE Trans. on Image Proc.*, vol. 5, no. 12, pp. 1637-1650, Dec. 1996.
24. "A Wavelet Transform Domain Adaptive Algorithm," S. Hosur and A. H. Tewfik, *IEEE Trans. on Signal Proc.*, pp. 617-630, March 1997.
25. "Data Hiding for Multimedia Personalization, Interaction and Protection," A. H. Tewfik and M. Swanson, *IEEE Signal Processing Magazine*, pp. 41- 43, July 1997.
26. "ULV and Generalized ULV Subspace Tracking Adaptive Algorithm," S. Hosur, A. H. Tewfik and D. Boley, *IEEE Trans. on Signal Proc.*, vol. 46, no. 5, p 1282-1297, May 1998.
27. "Multiresolution Video Watermarking using Perceptual Models and Scene Segmentation," M. Swanson, B. Zhu, A. H. Tewfik and B. Chau, *IEEE J. on Selected Areas in Comm.*, vol. 16, no. 4, pp. 540-550, May 1998.
28. "Robust Audio Watermarking Using Perceptual Masking," M. Swanson, B. Zhu, A. H. Tewfik and L. Boney, *Signal Processing*, vol. 66, no. 3, pp. 337-355, May 1998.
29. "Multimedia Interaction, Personalization and Protection: Data Embedding and Watermarking Technologies," M. Swanson, M. Kobayashi and A. H. Tewfik, invited paper, *Proc. IEEE*, vol. 86, no. 6, pp. 1064-1087, June 1998.
30. "Fast Progressively Refined Image Retrieval," M. Swanson and A. H. Tewfik, *Journal of Electronic Imaging*, vol. 7, no. 3, pp. 443-452, July 1998.
31. "Audio coding for representation in MIDI," N. Sieger and A. H. Tewfik, *Journal of VLSI Signal Proc. Systems for Speech, Image and Video Tech.*, vol. 20, no. 1-2 pp. 45-59, Oct. 1998.
32. "Optimal Waveforms for Wideband Radar Imaging," S. Sowelam and A. H. Tewfik, invited paper, *Special Signal Proc. issue of the J. of Franklin Institute*, vol. 335B, no. 8, pp. 1341-1366, Nov. 1998.
33. "Subband domain coding of binary textual images for document archiving," Omar Gerek, A. E. Cetin, A. H. Tewfik and V. Atalay, *IEEE Transactions of Image Processing*, vol. 8, no. 10, pp. 1438-1446, Oct. 1999.

34. "Arithmetic Coding with Dual Symbol Sets and Its Performance Analysis," Bin Zhu and A. H. Tewfik, *IEEE Trans. on Image Proc.*, vol. 8, no. 10, pp.1438-1446, December 1999.
35. "Signal Processing for Fault monitoring using Acoustic Emissions," G. T. Venkatesan, D. Zhang, M. Kaveh, A. H. Tewfik and K. M. Buckley, *International Journal of Electronics and Communications*, vol. 53, no. 6, pp. 333-338, 1999.
36. "Le Musee du Palias de Topkapi," A. E. Cetin, O. N. Gerek and A. H. Tewfik, *Museum International*, vol. 52, no. 1, pp. 22-25, 2000.
37. "Waveform Selection in Radar Target Classification," S. Sowelam and A. H. Tewfik, *IEEE Trans. on Info. Theory*, vol. 46, no. 3, p. 1014-1029, May 2000.
38. "Event-Driven Video Abstraction and Visualization," J. Nam and A. H. Tewfik, (invited paper) Special Issue on Multimedia Information and Systems, *Multimedia Tools and Applications*, vol. 16, no. 1, pp. 55-77, Kluwer Academic Publishers, Jan. 2002.
39. "A Construction of Space-Time Code Based on Number Theory," M. O. Damen, A. H. Tewfik and J. - C. Belfiore, *IEEE Trans. on Info. Theory*, vol. 48, no. 3, p. 753, March 2002.
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96. “A Framework for Inference Using Goodness of Fit Tests Based on Ensemble of Phi-Divergences”, N. Kundargi, Yingxi Liu and A. Tewfik, *IEEE Transactions on Signal Processing*, vol.61, no.4, pp.945-955, Feb.15, 2013, doi: 10.1109/TSP.2012.2226448.

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99. "Primary Traffic Characterization and Secondary Transmissions," Yingxi Liu and A. Tewfik, to appear in *IEEE Transactions on Wireless Communications*, 2014.

Plenary and Keynote Talks

1. "Potentials and Limitations of Wavelets in Signal Acquisition and Processing," A. H. Tewfik, *15th Annual Int. Conf. of the IEEE EMBS*, San Diego, Oct. 1993.
2. "Digital Fractals," A. H. Tewfik, *1994 IEEE Conf. on Acoust. Speech and Signal Proc.*, Adelaide, Australia, April 1994.
3. "Wavelets: Theory and Applications," *1995 IEEE EMBS Summer School*, Siena, Italy, July 1995.
4. "Multimedia and the Internet," *SIU'99*, Bilkent University, Ankara, Turkey, June 1999.
5. "Revolution In Online Music Distribution and Portable Players," *1999 IEEE-EURASIP Workshop on Nonlinear Signal and Image Processing*, Antalya, Turkey, June 1999.
6. "Multimedia distribution: Present and Future," A. H. Tewfik, *Proc. 2001 IEEE Int. Symp. On Signal Proc. And Info. Theory*, Cairo, Egypt, Dec. 2001.
7. "Multimedia distribution: Present and Future," A. H. Tewfik, *SSGRR2002w International Conference on Advances in Infrastructure for Electronic Business, Science, and Education on the Internet*, L'Aquila, Italy, January 2002.
8. "Transmitting, Personalizing And Protecting Multimedia Content," A. H. Tewfik, *Transmitting, processing and watermarking multimedia contents4th cost 276 workshop, Information and Knowledge Management for Integrated Media Communication*, Bordeaux, France, March 2003.
9. "Wisenets: Wireless Local Communications, Computing and Storage Networks," A. H. Tewfik, *10th IEEE International Conference on Electronics, Circuits and Systems (ICECS 2003)*, Sharjah, U.A.E., December 2003.

10. "Bounded Error Subset Selection," A. H. Tewfik, *SampTA05: Sampling Theory and Applications*, 2005, Samsun, Turkey, July 2005.
11. "Trends in Diagnostics, Prevention and Management," A. H. Tewfik, *Cairo International Biomedical Engineering Conference*, Cairo, Egypt, December 2006.
12. "Signal Processing Trends in Disease Diagnostics, Prevention and Management," A. H. Tewfik, *IEEE Int. Symposium On Signals, Circuits And Systems*, Iasi, Romania, July 2007.
13. "High Impact Publications: Lessons from the IEEE Signal Processing Society," A. H. Tewfik, *Second Arabian Journal on Science and Engineering Workshop*, Dahrn, Saudi Arabia, December 2009.
14. "Sparseness, Compressed Sensing and Multi-channel Analog to Digital Conversion," A. H. Tewfik, *IEEE Workshop on Signal Processing Systems*, Beirut, Lebanon, October 2011.
15. "Novel directions in synthetic biology," A. H. Tewfik, *IEEE-Cairo University Cairo International Biomedical Engineering Conference*, Cairo, Egypt, December 2012.

Tutorial Presentations

1. "Wavelets: Theory and Applications," invited, *1994 IEEE Time-Frequency and Time-Scale Symp.*, Philadelphia, PA, Oct. 1994.
2. "Watermarking for Audio, Image and Video," invited, *1998 IEEE Int. Conf. on Image Processing*, Chicago, October 1998.
3. "A Unified View of Ultrawideband Communications," *2003 Fall IEEE Vehicular Technology Conference*, Orlando, FL, 2003.
4. "Multirate and Subband Signal Processing in Ultrawideband Communications," *2004 IEEE Int. Symp. On Circuits and Systems (ISCAS'04)*, Vancouver, B.C., Canada, May 2004.
5. "Design of Programmable Wireless Networks aka Cognitive Radio ," *IEEE Portable*, Orlando, FL, March 2007. (With R. Harjani, K. Parhi and G. Sobelman.)
6. "Design of Programmable Wireless Networks aka Cognitive Radio ," *IEEE Symposium on Circuits and Systems*, New Orleans, LA, May 2007. (With R. Harjani, K. Parhi and G. Sobelman.)

7. "Medical Sensing Technologies for Patient Assistance," invited, *Tech Tune-up*, Univ. of Minnesota, May 2007.
8. "Bioinformatics," *2008 IEEE Int. Conf. Acoust., Speech and Signal Proc.*, Las Vegas, Nevada, March-April 2008, (with P. P. Vaidyanathan, E. Dougherty and H. Vikalo.)
9. "Wearable and Implantable Sensors," invited, *Tech Tune-up*, Univ. of Minnesota, June 2008.

Invited Conference Publications:

1. "Maximum Entropy Estimation for 2-D Isotropic Random Fields," A. H. Tewfik, B. C. Levy and A. S. Willsky, in *Proc. 1987 Conf. on Information Sciences and Systems*, Princeton, NJ, March 1987.
2. "A Multigrid Approach to Object Support Estimation from Diffraction-Limited Images," A. H. Tewfik, invited presentation, in *Proc. IEEE Inter. Conf. on Systems Engineering*, Pittsburgh, PA, August 1990.
3. "Wavelet Techniques in Image Processing," A. H. Tewfik and P. E. Jorgensen, invited paper, in *Proc. 44th Soc. for Imaging Science and Technology Conference*, St. Paul, MN, May 1991.
4. "Fast Multiscale Statistical Signal Processing Algorithms," A. H. Tewfik and M.-Y. Kim, invited paper, in *Proc. 25th Asilomar Conference on Signals, Systems and Computers*, Monterey, CA., Nov. 1991.
5. "Robust Wavelet Domain Array Processing," A. H. Tewfik and M.-Y. Kim, invited paper, in *Proc. 6th IEEE Signal Proc. Workshop on Statistical Signal and Array Proc.*, Victoria, B. C., Canada, Sept. 1992.
6. "Fast Multiscale Statistical Signal Processing Algorithms," A. H. Tewfik and M.-Y. Kim, invited paper, in *Proc. of the 1992 IEEE Conf. on Acoust. Speech and Signal Proc.*, San Francisco, CA, March 1992.
7. "Wavelets in Optimal Radar Range-Doppler Imaging," A. H. Tewfik, invited paper, in *Proc. 26th Asilomar Conference on Signals, Systems and Computers*, Monterey, CA., Oct. 1992.
8. "Estimation of Range-Doppler Radar Images," A. H. Tewfik, invited paper, in *Proc. of the 1993 IEEE Symp. on Circuits and Systems*, Chicago, IL, May 1993.
9. "Acoustical Applications of Wavelets: Sonar and Audio Coding," A. H. Tewfik, invited paper, in *Proc. 125th Meeting of the Acoustical Society of America*, Ottawa, Canada, May 1993.

10. "Enhanced Wavelet Based Audio Coder," A. H. Tewfik and M. Ali, invited paper, in *Proc. 27th Asilomar Conference on Signals, Systems and Computers*, Monterey, CA., Nov. 1993.
11. "Recent Developments in Wavelet Theory and Applications," A. H. Tewfik, invited paper, *NSF Sponsored International Conference on Mathematical Analysis and Signal Processing*, Cairo, Egypt, Jan. 1994.
12. "Recent Progress in the Application of Wavelets in Surveillance Systems," A. H. Tewfik and S. Hosur, invited paper, in *Proc. SPIE Conf. on Wavelet Applications*, SPIE Proc. Vol. 2242, April, 1994.
13. "M-target Class Adaptive Radar Range-Doppler Imaging in Clutter: Theory and Experimental Results," A. H. Tewfik and S. Sowelam, invited paper, in *Proc. SPIE Conf. on Wavelet Applications for Dual Use*, April 1995.
14. "Wavelets: A Passing Wave or a Truly Useful Tool?," A. H. Tewfik, invited paper, in *Proc. SPIE Conf. Digital Processing Technology (Critical Review)*, April 1995.
15. "Coding and Decoding Techniques for Multiscale Difference Equation Signal Models," M. Ali and A. H. Tewfik, invited paper, in *1995 IEEE Workshop on Nonlinear Signal and Image Processing*, Greece, June 1995.
16. "Adaptive Signal Representations in Signal Acquisition and Processing", M. Ali and A. H. Tewfik, invited paper, in *17th Annual Int. Conf. of the IEEE EMBS*, Sept. 1995.
17. "Transparent Robust Image Watermarking," M. Swanson, B. Zhu and A. H. Tewfik, invited paper, in *Proc. 1996 IEEE Int. Conf. Image Proc.*, Lausanne, Switzerland, Sept. 1996.
18. "Audio Coding: An Overview," A. H. Tewfik, invited paper, in *Twenty-Sixth Annual IEEE Communication Theory Workshop*, Tucson, Arizona, April 1997.
19. "Audio Watermarking and Data Embedding-Current State of the Art, Challenges and Future Directions," invited paper, in *Multimedia and Security Workshop, ACM Multimedia '98*, Bristol, September 1998.
20. "Low Complexity M-Hypothesis Detection: M vector Case," invited paper, in *Proc. 32nd Asilomar Conference on Signals, Systems and Computers*, Monterey, CA., Nov. 1998.
21. "Content Based Retrieval: Who needs it", invited panel presentation, *1999 Electronic Imaging: Science and Tech.*, San Jose, CA, Jan. 1999.

22. "Data Embedding in Audio: Where Do We Stand," Ahmed H Tewfik, Mitchell D Swanson, Bin Zhu, invited paper, in *Proc. 1999 IEEE International Conference on Acoustics, Speech and Signal Processing*, Phoenix, Arizona, March 1999.
23. "Current State of the Art, Challenges and Future Directions for Audio Watermarking," Mitchell D Swanson, Bin Zhu and Ahmed H Tewfik, invited paper, in *Proc. IEEE Int. Conf. Multimedia Computing and Systems*, Florence, Italy, June 1999.
24. "Self-Organizing Map Neural Network For Transient Signal Classification In Mechanical Diagnostics," Haoying Sun, Mostafa Kaveh, and Ahmed Tewfik, invited paper, in *Proc. 1999 IEEE-EURASIP Workshop on Nonlinear Signal and Image Processing*, Antalya, Turkey, June 1999.
25. "Multimedia Distribution: Personalization and Secure Watermarking," invited paper, A. H. Tewfik and M. Mansour, in *Proc. SSGRR2002w International Conference on Advances in Infrastructure for Electronic Business, Science, and Education on the Internet*, L'Aquila, Italy, January 2002.
26. "Security and Data Integrity," A. H. Tewfik, *NSF Signal Authentication Workshop*, Cocoa Beach, Florida, May 2002.
27. "Improving The Security Of Watermark Public Detectors," M. F. Mansour and A. H. Tewfik, *14th IEEE International Conference On Digital Signal Processing*, Santorini, Greece, July 2002.
28. "Synchronous UWB-OFDM," Ebrahim Saberinia and A. H. Tewfik, *IEEE International Symposium on Advances in Wireless Communications*, Victoria, BC, Canada, September 2002.
29. "Generalized Ultrawideband Communications: Theory and Application," A. H. Tewfik, *Transmitting, processing and watermarking multimedia contents 4th cost 276 workshop, Information and Knowledge Management for Integrated Media Communication*, Bordeaux, France, March 2003.
30. "Unified View of UWB Systems," A. Tewfik and E. Saberinia, invited paper, in *IEEE 2003 Radio and Wireless Conference (RAWCON), UWB Systems and Applications Workshop*, Boston, MA, August 2003.
31. "Multi-user UWB Communications," E. Saberinia and A. Tewfik, invited paper, in *2003 IEEE Pacific Rim Conf. on Communications, Computers and Signal Processing (PACRIM'03)*, Victoria, B.C., Canada, August 2003.

32. "Ultrawideband Wireless Communications: Outlook and New Directions," A. Tewfik, *NSF Workshop On Wireless Telecommunications, US-Egypt economic development partnership*, Cairo, Egypt, Jan. 2004.
33. "Pulsed OFDM modulation for Ultra wideband Communications," E. Saberinia, A. Tewfik, J. Tang and K. Parhi, invited paper, in *2004 IEEE Int. Symp. On Circuits and Systems (ISCAS'04)*, Vancouver, B.C., Canada, May 2004.
34. "System aspects of multi-band UWB-OFDM: status and optimal design rules," A. Tewfik and E. Saberinia, invited paper, in *IEEE 2004 Radio and Wireless Conference (RAWCON), UWB Technology Components, Systems, and Architectures Workshop*, Atlanta, GA, September 2004.
35. "Reduced Complexity Bounded Error Subset Selection," M. Alghoniemy and A. H. Tewfik, invited paper, in *Proc. 2005 IEEE International Conference on Acoustics, Speech and Signal Processing*, Philadelphia, PA, March 2005.
36. "Biclustering of DNA Microarray Data with Early Pruning" Ahmed H Tewfik and A. Tchagang, invited paper, in *Proc. 2005 IEEE International Conference on Acoustics, Speech and Signal Processing*, Philadelphia, PA, March 2005.
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324. "Long-term movement tracking from Local Field Potentials with an adaptive open-loop decoder," Vijay Aditya Tadipatri, A. H. Tewfik, J. Ashe, to appear in *2014 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, May 4-9, 2014.

Distinguished IEEE Lecturer Presentations

1. Purdue Univ., Dept. of Electrical Engineering Colloquium, "Multimedia Signal Processing," Nov. 1997.
2. Rochester NY IEEE Signal Processing Chapter, "Multimedia Signal Processing," Nov. 1997.
3. General Electric Corporate Research Laboratory, "Multimedia Signal Processing," Nov. 1997.
4. Washington State University, Dept. of Electrical Engineering Colloquium, "Multimedia Signal Processing," March 1998.
5. NJIT, Dept. of Electrical Engineering Colloquium, "Multimedia Signal Processing," April 1998.
6. University of Minnesota and IEEE Signal Processing Chapter, Twin Cities, "E-commerce, Multimedia and Signal Processing," April 1998.
7. Washington State University, Dept. of Electrical Engineering Colloquium, "Multimedia Signal Processing," March 1998.
8. NJIT, Dept. of Electrical Engineering Colloquium, "Multimedia Signal Processing," April 1998.
9. University of Minnesota and IEEE Signal Processing Chapter, Twin Cities, "E-commerce, Multimedia and Signal Processing," April 1998.

10. CNRS, Paris, France, “Commerce Électronique, Multimédia et Traitement Du Signal,” Nov. 1998.

IEEE Wireless 802 Standards Meetings Presentations

1. 03147r1P802-15_TG3a-University-of-Minnesota-CFP-Presentation.ppt, March 2003.
2. 03147r3P802-15_TG3a-University-of-Minnesota-CFP-Presentation.ppt, May 2003.
3. 03147r4P802-15_TG3a-University-of-Minnesota-CFP-Presentation.ppt, July 2003.

Other Presentations

1. Carnegie Mellon University, Signal Processing Seminar, “Wavelet Representations”, Aug. 1990.
2. University of California, Santa Barbara, Departmental Seminar, “Multiscale Techniques in Signal Processing”, Feb. 1991.
3. Texas Instruments, Central Research Laboratory, Dallas, TX, “Introduction to Multiscale Signal Processing”, June 1991.
4. Texas Instruments, Central Research Laboratory, Dallas, TX, “Wavelet Techniques in Audio Coding”, June 1991.
5. Cornell University, Signal Processing Seminar, “Wavelets and Signal Processing” June 1991.
6. Rome Air Defense Center, Rome, NY, “Multiscale Techniques in Surveillance and Data Fusion”, June 1991.
7. Rosemount, Inc., Eden Prairie, MN, “Wavelets in the Implementation of Signal Processing Algorithms”, Aug. 1991.
8. AT&T Bell Laboratories, Murray Hill NJ, Signal Processing Seminar, “On the Optimal Choice of a Wavelet for Signal Representation”, August 1991.
9. AT&T Bell Laboratories, Murray Hill NJ, Signal Processing Seminar, “Filtered Fractal Signal Models”, August 1991.
10. University of Minnesota, Electrical Engineering Colloquium, “Scaling and Similarity in Signal Processing,” Nov. 1991.

11. Medtronic, Inc., Fridley, MN, "Multiscale Signal Processing", Nov. 1991.
12. Texas Instruments, Computer Science Laboratory, Dallas, TX, "Adaptive Wavelet Based Audio Coding", March 1992.
13. Texas Instruments, Defense Systems Group, Dallas, TX, "Wavelets in High Resolution Radar Imaging", March 1992.
14. Texas Instruments, Central Research Laboratory Colloquium, Dallas, TX, "Wavelets in Signal and Image Processing," March 1992.
15. Institute of Mathematics and Its Applications, University of Minnesota, Workshop on Linear Algebra in Signal Processing, "Wavelets in Signal and Image Processing," April 1992.
16. DARPA Wavelet Meeting, "Wavelet Domain Radar Signal Processing," April 1992.
17. General Electric Corporate Research Laboratory, "Wavelets in Radar and Medical Imaging," May 1992.
18. Rome Air Defense Center, Rome, NY, "Wavelet Techniques in Surveillance Systems," September 1992.
19. ARPA Joint ATR Workshop, "Robust Multiresolution Integrated Target Sensing And Recognition," MIT Lincoln Labs., Nov. 1993.
20. Naval Weapons Center, China Lake, CA, "Wavelets and Radar Signal Processing," December 1993.
21. University of Minnesota, Physics Colloquium, "Wavelets: Theory and Applications," Feb. 1994.
22. ARPA, Washington, D.C., "Robust Multiresolution Integrated Target Sensing And Recognition," July 1994.
23. NSA, Washington, D.C., "Wavelets: Theory and Applications," Jan. 1995.
24. NRaD, San Diego, CA, "Adaptive Waveform Selection for High Resolution Range-Doppler Radar Imaging," Feb. 1995.
25. Texas Instruments, Dallas, TX, "Signal Processing and Multimedia," Jan. 1996.
26. IBM, Tokyo, Japan, "Watermarking Digital Audio and Imagery," June 1996.

27. Tokyo Univ., Dept. of Math., "Wavelets: Potentials and Limitations," June 1996.
28. Bilkent Univ., Ankara, Turkey, "Signal Processing and Multimedia," July 1996.
29. NEC, Princeton, NJ, "Digital Watermarks for Audio and Images," Aug. 1996.
30. Northern Illinois University, Dept. of Electrical Engineering Colloquium, "Multimedia: The new Signal Processing Frontier," Oct. 1996.
31. Drexel Univ., Dept. of Electrical Engineering Colloquium, "New Vistas in Signal Processing: The Multimedia Challenge," Nov. 1996.
32. Optical Society of America, Minneapolis Chapter, "Wavelets: Theory and Applications," May 1998.
33. Air Force Research Laboratory, Rome, NY, "Data Embedding in Imagery," February 1999.
34. Air Force Research Laboratory, Rome, NY, "High Capacity Data Embedding," September 1999.
35. Institute of Math and Its Applications, Minneapolis, Minnesota, "Music 2001," February 2001.
36. King Fahd University of Minerals and Petroleum, Dahrhan, Saudi Arabia, "Image Coding over Unreliable Channels," March 2001.
37. IEEE Dahrhan Section, Dahrhan Saudi Arabia, "Watermarking: Applications and Limitations," March 2001.
38. Air Force Research Laboratory, Rome, NY, "Provably Secure Watermarking," May 2001.
39. Microsoft Research Asia, Beijing, China, "Multimedia Distribution Issues," July 2002.
40. Microsoft Research Asia, Beijing, China, "Wireless Server and Storage Networks," July 2002.
41. Mitsubishi Electric Research Laboratory, Middletown, NJ, "UWB-OFDM Communications," October 2002.
42. Digital Technology Center, University of Minnesota, "Multimedia Distribution: General Overview and Media Security", November 2002.

43. Digital Technology Center, University of Minnesota, "Single and Multi Carrier UWB," November 2002.
44. Ecole Normale Supérieure de Telecommunications, Paris, France, "Distribution De La Multimedia: Vue D'Ensemble Et Questions De Securite," December 2002.
45. 3M, St. Paul, MN, "2-D Wavelets with Adaptive Support", June 2003.
46. Cairo University, Cairo, Egypt, "Unified Treatment of UWB Communications", August 2003.
47. Michigan State University, East Lansing, Michigan, "Ultrawideband Communications: Overview and Outlook," October 2003.
48. Honeywell, Minneapolis, MN, "Ultrawideband Communications: Overview and Outlook," October 2003.
49. Cukurova University, Adana, Turkey, "Subset Selection in Signal Representation and Classification," Jan. 2005.
50. Koc University, Istanbul, Turkey, "Bounded Error Subset Selection," July 2005.
51. Koc University, Istanbul, Turkey, "Uncovering Genetic Pathways via Biclustering of DNA Microarray Data," July 2005.
52. Minnesota High Tech Association, "Wireless Communications: Ubiquitous Communications Comes Of Age," Oct. 2005.
53. Minnesota High Tech Association, "Tomorrow's Wireless Landscape," Oct. 2005.
54. IEEE Signal Processing Chapter, Chicago, IL and Univ. of Illinois, Chicago, "Biclustering in Genomics," Feb. 2006.
55. Ohio State University, "Biclustering in Genomics," April 2006.
56. Univ. of Illinois, Chicago, "The Quest For Additional Wireless Bandwidth And Higher Data Rates," July 2006.
57. Cukurova University, Adana, Turkey, "Diagnosing and Assisting Patients with Neurological Pathologies," Feb. 2007.
58. Bogazici University, Istanbul, Turkey, and IEEE Signal Processing Chapter, Turkey, "Subset Selection in Classification," Feb. 2007.

59. Boston University, "Biclustering and the Search for Group Biomarkers," April 2007.
60. RPI, "Biclustering and the Search for Group Biomarkers," May 2007.
61. Tech Tune-Up, Univ. of Minnesota, Minneapolis, MN, "Medical Sensing Technologies for Patient Assistance", June 2008.
62. Honeywell Automation and Control Solutions 2007 Fellows Symposium, "Rethinking Spectral Congestion," October 2007.
63. IEEE Signal Processing Chapter, Dallas, TX, "Biclustering and the Search for Group Biomarkers," Dec. 2007.
64. Univ. of Texas in Dallas, "Subset Selection," Dec. 2007.
65. Texas Instruments, Dallas, TX, "Trends in Diagnostics, Prevention and Management: A University of Minnesota Signal Processing Perspective," Dec. 2007.
66. MN Nano Association, Minneapolis, MN, "Rethinking Spectral Congestion," March 2008.
67. Goodrich Corp, Burnsville, MN, "Emerging Technologies in Wireless Communications: Ultrawideband and Cognitive Radio," May 2008.
68. Massachusetts Institute of Technology, Cambridge, MA, "Cell Phone Speech Enhancement via Sparse Reconstructions", May 2008.
69. Tech Tune-Up, Univ. of Minnesota, Minneapolis, MN, "Wearable and Implantable Sensors", June 2008.
70. Texas Instruments, Dallas, TX, "Speech Separation in Cell Phones," July 2008.
71. Queen Mary University of London, London, UK, "Cell Phone Speech Enhancement," July 2008.
72. National Telecommunications regulatory Agency of Egypt, Cairo, Egypt, "Speech Separation in Cell Phones," August 2008.
73. North Carolina State University, Raleigh, NC, "Local Field Potential Neural Prosthetics," November 2008.
74. University of Utah, Salt Lake City, Utah, "Local Field Potential Neural Prosthetics," February 2009.

75. IEEE Signal Processing Chapter, Rochester, NY, "Adaptive Local Field Potential Neural Prosthetics," April 2009.
76. National Telecommunications regulatory Agency of Egypt, Cairo, Egypt, "ProTOMAC: Proactive Transmit Opportunity Detection at the MAC Layer for Cognitive Radio Networks," August 2009.
77. Nile University, Giza, Egypt, "Extracting Behavior Specific Components from Local Field Potential Signals in Neural Prosthetics," April 2009.
78. Cairo University, Cairo, Egypt, "Real Time Tracking of 3D Organ Deformation Using Limited Field Optical Views," November 2009.
79. IEEE Aerospace and Electronic Systems society Chapter of Twin Cities, Eagan, MN, "ProTOMAC: Proactive Transmit Opportunity Detection at the MAC Layer for Cognitive Radio Networks," January 2010.
80. IEEE Instrumentation and Measurement Society Meeting, Austin, TX, "Proactive Transmit Opportunity Detection in Cognitive Radio Networks," October 2010.
81. National Instruments, Austin, TX, "Diagnostics, Prevention and Management," December 2010.
82. 2011 Electrical and Computer Engineering Department Heads Association Conference, Phoenix, Arizona, "Challenges and Opportunities for ECE in the Coming Decades," Panelist, March 2011.
83. Cairo University, Cairo, Egypt, "Multiple-Channel A/D Conversion with a Single Sigma Delta Modulator," August 2011.
84. IEEE Smart Tech: Metro Area Workshop Series, Austin, TX, "The Future of Electrical and Computer Engineering," October 2011.
85. King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia, "Proactive Transmit Margin Based Cognitive Radio," February 2012.
86. King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia, "Real Time Tracking of 3D Organ Surfaces Using Single MR Image and Limited Optical Viewing," February 2012.
87. Cairo University, Cairo, Egypt, "Overcoming Physical Challenges in Medical Imaging," February 2012.
88. University of Texas San Antonio, San Antonio, Texas, "Segmented Rapid Magnetic Resonance Imaging," March 2012.

89. Texas Tech University, Lubbock, Texas, “Overcoming Physical Challenges in Medical Imaging,” April 2012.
90. University of Louisiana at Lafayette, Lafayette, Louisiana, “Overcoming Physical Challenges in Medical Imaging,” April 2102.
91. Texas Instruments, Tucson, Arizona, “Multiple-Channel A/D Conversion with a Single Sigma Delta Modulator,” May 2012.
92. Cairo University, Cairo, Egypt, “Behavioral Networking and Decision Making,” August 2012.
93. King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia, “Information Sequencing and Communications for Rational Decision Making,” February 2013.
94. Iowa State University, Ames, Iowa, “Behavioral Networking and Decision Making,” April 2013.

Professional Activities

- Member of the Editorial Board, *IEEE Signal Processing Magazine*, 2005 – 2008.
- Associate Editor for the *EURASIP J. Bioinformatics and Systems Biology*, 2005 - Present.
- Guest Editor for a special issue on “Bioinformatics”, for the IEEE J. Selected Topics in Signal Processing, 2007-2008.
- Guest Editor for a special issue on “UWB Communications”, for the *EURASIP J. Wireless Communications and Networking*, 2005-2006.
- President, *IEEE Communications and Signal Processing Chapter*, Twin Cities, MN, 2003 -2005.
- Guest Editor for a special issue on “Watermarking”, *IEEE Trans. on Signal Processing*, 2002.
- Guest Editor for a special issue on “Multimedia Databases”, *IEEE Trans. on Multimedia*, 2001-2002.
- Founding Editor of the *IEEE Signal Proc. Letters*, April 1993- 1999.

- Guest Editor for a special issue on “Wavelets in Signal Processing”, *IEEE Trans. on Signal Proc.*, 1997-1998.
- Guest Editor for a special issue on “Wavelets in Signal Processing”, *IEEE Trans. on Signal Proc.*, 1992-1993.
- Associate Editor for the *IEEE Trans. on Signal Proc.*, Nov. 1989-Oct. 1991.
- Member of the Technical Committee for the 1992 and 1996 *IEEE Digital Signal Processing Workshop*, Loen, Norway, Sept. 1996.
- Member of the Technical Committee for the 1995 and 1996 *SPIE Wavelet Applications Conferences*, Orlando, Fla., April 1996.
- Member of the Technical Committee for the 1996 *SPIE Visual Communications and Image Processing Conference*, Orlando, Fla., March 1996.
- Organizer and Chair of a Special Session on “Fractals and Multiscale Difference Equation Models,” 1995 *IEEE Workshop on Nonlinear Signal and Image Processing*, Neos Marmaras, Greece, June 1995.
- Member of the Multimedia Signal Processing Technical Committee of the *IEEE Signal Processing Society*, 1998 - 2002.
- Member of the Digital Signal Processing Technical Committee of the *IEEE Signal Processing Society*, 1992-1998.
- Organizer and Chair of a Minisymposium on “New Directions in Signal Processing,” as part of the *SIAM Meeting on Control and Its Applications*, Minneapolis, MN, Sept. 1992.
- Member of the Organizing Committee for the *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP'93)*, Minneapolis, MN, May 1993.
- Member of the Technical Committee for the 4th *IEEE Workshop on Spectrum Estimation and Modeling*, Minneapolis, MN, Aug. 1988.
- Reviewer for the *IEEE Trans. on Signal Processing* (Previously the *IEEE Trans. Acoust., Speech and Signal Proc.*), *IEEE Trans. on Circuits and Systems*, *IEEE Trans. on Information Theory*, *IEEE Trans. on Automatic Control*, and the *Journal Society America A*.
- Reviewer for the Addison-Wesley and McGraw-Hill Publishing Companies.

- Reviewer and Panel member for the National Science Foundation and the Air Force Office of Scientific Research.

External Research Grants

1. AT&T Special Purpose Grant, "Research Equipment for Multidimensional Signal Processing," \$20,280, Oct. 1988-Oct. 1989.
2. NSF, "CISE Research Instrumentation," \$50,000 plus \$30,000 in Univ. of Minnesota matching funds, with M. Kaveh, Aug. 1989-Jan. 31, 1991.
3. NSF Research Initiation Grant, "Filtered Fractal Analysis for Intelligent Systems," \$60,000, July 1990-June 1992.
4. Texas Instruments, "Novel Multiscale Approaches to Low Bit Rate Speech Coding," \$24,800, 3/91-2/92.
5. AFOSR, "Multiscale and Multigrid Information Representation and Fusion," \$28,388, February 1992-January 1993.
6. Texas Instruments, "Wavelets in Signal Processing," \$26,500, January 1992-December 1992.
7. NSF, "Fast High Resolution Wavelet Based Magnetic Resonance Imaging," \$48,783, May 1992-April 1993.
8. ONR, "Wavelet Domain Radar Signal Processing," \$235,012, June 1992-June 1995.
9. Texas Instruments, "Adaptive Wavelet Decompositions," \$28,500, January 1993-December 1993.
10. AFOSR, "Multiscale Surveillance Information Acquisition and Fusion," \$148,209, February 1993-January 1995.
11. Alaska Dept. of Fish and Game/InfoPet, Inc., "Expert Computer Vision Based Crab Classification System," \$73,498, February 1993-July 1994.
12. ARPA, "Robust Multiresolution Integrated Target Sensing and Recognition," \$499,850, June 1993-May 1996.
13. Texas Instruments, "Wavelet Techniques in Signal Acquisition and Coding," \$20,000, January 1994- December 1994.
14. NSF, "Museum Audio Visual Information Management System, \$33,905, August 1994-July 1997.
15. CRASP/USC, "Wavelet Domain And Subspace Tracking Adaptive Beamforming and Filtering," \$42,000, Oct. 1994- Oct. 1995.
16. Computing Devices International, Inc., "Wavelet Coding of Aerial Imagery," \$20,000, November 1994- October 1995.
17. Texas Instruments, "Audio and Visual Signal Coding and Management," \$20,000, January 1995- December 1995.

18. AFOSR, "New Priorities in a changing US Economy," \$450,000, Sept. 1994- Oct. 1997. (With A. Tannenbaum, A. H. Tewfik's share: \$321,500.)
19. Alaska Dept. of Fish and Game, "Vision Based Crab Classification," \$76,750, Oct. 1994 - June 1996.
20. ONR, "Integrated Microsensors for Aircraft Fatigue and Failure Warning," Dec. 1994- Dec. 1999, Univ. Of Minnesota share in 1995- 1996: \$685,224 . (D. Polla, Univ. Of Minnesota, PI. Part of an MURI that included Georgia Tech and Northwestern University. Tewfik was one of three faculty in Signal Processing supported by this grant.)
21. ONR, "Adaptive Radar Imaging and Signal Processing," \$316,854, June 1995-June 1998.
22. CRASP/USC, "Adaptive Discrete Time Stochastic Resonance And Its Applications," \$40,000, Sept. 1995 - Aug. 1996.
23. AFOSR, "Reduced Signature Target Detection," Univ. Of Minnesota share: \$653,998, Feb. 1996- March 2002. (D. Castanon, Boston University, PI. With A. Tannenbaum. Part of an MURI to a consortium that includes Boston University, Northeastern University, MIT, University of Michigan and Stanford University.)
24. NSF, "Cooperative Research in Lossy Data Compression," \$8,820, December 1996- November 1998, with J. Kieffer.
25. Alaska Dept. of Fish and Game, "Development of a Crab and Ground Fish Classification System", \$81,958, March 1997 - March 1999.
26. NIH, "Specialized Ultrasound Beams for Medical Imaging," \$110,000, September 1997 – June 2000.
27. AFRL, "Data Embedding in Imagery and Its Applications," \$399,999, June 1998 – December 2001.
28. NSF, "Mobile Communications and Networking," \$820,000, Oct. 1999- Sept. 2002, (G. B. Giannakis, PI).
29. NSF, "Graduate Student Travel to ICME," \$15,000, July-December 2002.
30. NSF, "ITR: Generalized Ultrawideband Communications for High Speed Networking," \$499,000, July 2003-June 2006.
31. NSF, "Food Quality and Safety by Kernel Classification," \$35,000, (no overhead) April 2004-March 2007.
32. StorageTek, "DTC Intelligent Storage Consortium", \$135,000, Dec. 2002- Dec. 2005, (with D. Du, D. Lilja, Y. Kim and J. Weissman).
33. 3M, "Stethoscope Diagnostic Aid", \$260,000, Sept. 2003-Sept. 2005, (A. Erdman, PI).
34. Honeywell, "Localization and Ranging in Sensor Networks", \$25,000, (reduced overhead) July 2004-July 2005.

35. LSI Logic Corp/Engenio, "DTC Intelligent Storage Consortium", \$190,000, March 2004- March 2008, (with D. Du, D. Lilja, Y. Kim and J. Weissman).
36. Symantec, "DTC Intelligent Storage Consortium", \$225,000, May 2004- May 2008, (with D. Du, D. Lilja, Y. Kim and J. Weissman).
37. SUN Microsystems, "DTC Intelligent Storage Consortium", \$270,000, Dec. 2002- Dec. 2008, (with D. Du, D. Lilja, Y. Kim and J. Weissman).
38. Smaby, "A Wireless Hearing Aid Microphone Array," \$15,689, (reduced overhead) Jan. 2005-May 2005.
39. DARPA, "Non-Intrusive Health Monitoring for Post-Battle Wellness Management," \$300,000, Feb. 2006 – Feb. 2008. with Red Wing Technologies)
40. Veterans Administration, "Research Post-Doc: Neural Network of Auditory Verbal Hallucination," \$25,299.6, Oct. 2005 – Sept. 2006. (with M. Stephan)
41. Texas Instruments, "Speaker Separation in Cellular Handsets," \$75,000 (direct costs), Sept. 2006 – May 2008.
42. Veterans Administration, "The Neural Network of Auditory Verbal Hallucinations," \$40,000 (direct costs), Oct. 2006 – Sept. 2009. (with M. Stephan)
43. MN Department of Transportation, "Revision of the MnROAD Offline Data Peak-Picking Program", \$21,463 (direct costs), April 2006 - Jan. 2007.
44. MN Department of Transportation, "Vehicle Position Tracking During Load Response Testing", \$80,000 (direct costs), Nov. 2007- May 2010.
45. AVSI Consortium (BAE, Boeing, Goodrich, Honeywell, Lockheed Martin, Rockwell Collins, Smiths Aerospace, UTC), "Feasibility of Intra Aircraft Wireless Sensors," Phase I: \$80,000, March 2008 – April 2009. (with Y. Kim, N. Hopper and M. Heimdahl)
46. Texas Instruments, "Speaker Separation in Cellular Handsets," \$50,000 (direct costs only), Sept. 2008 – May 2009.
47. MN Department of Transportation, "Vibrating Wire and Horizontal Clip Data Analysis", \$70,000 (direct costs), June 2008- June 2010.
48. Texas Instruments, "Speaker Separation in Cellular Handsets," \$50,000 (direct costs only), Sept. 2009 – May 2010.
49. National Science Foundation, "ProTOMAC: Proactive Transmit Opportunity Detection at the MAC Layer for Cognitive Radio Networks," \$300,000, Aug. 2009-Aug. 2012.
50. National Science Foundation, "Funding for Graduate Student Travel to ICIP 2009," \$15,000, Aug. 2009-Aug. 2010.
51. Texas Instruments, "Speaker Separation in Cellular Handsets," \$65,000 (direct costs only), Sept. 2010 – Aug. 2011.

52. Texas Instruments, "Multiple-Channel A/D Conversion with a Single Sigma Delta Modulator," \$65,000 (direct costs only), Sept. 2011 – Aug. 2012.
53. Texas Instruments, "Multiple-Channel A/D Conversion with a Single Sigma Delta Modulator," \$65,000 (direct costs only), Sept. 2012 – Aug. 2013.
54. Veterans Administration, "Decoding of Force from Neural Signals in Motor Cortex," \$1,070,120 (direct costs only, funds still held by Univ. of MN), Sept. 2012-Aug. 2016. (J. Ashe, PI, with G. Pellitzer and F. Ince)
55. British Petroleum, "BP Project 20K: Human Factors, Decision Making and Safety to Inform Concept Selection," \$471,497, June 1, 2013-August 31, 2014. (with S. Shakkottai, G. De Veciana and R. Hastie)

Internal Grants

1. Graduate School Grant-in-Aid, "Multidimensional Signal Processing," \$8,700, Jan. 1988-Sept. 1988.
2. Graduate School Grant-in-Aid, "Parallel and Distributed Signal Processing," \$9,500, July 1988-June 1989.
3. Graduate School Grant-in-Aid, "Parallel and Hierarchical Target Recognition," \$10,645, July 1989-June 1990.
4. Graduate School Grant-in-Aid, "Equipment for VLSI and Image Processing," \$22,500, with K. Parhi, July 1990- June 1991.
5. Graduate School Grant-in-Aid, "Uncovering Biomarkers and Genetic Pathways in Ovarian Carcinoma," \$23,083, with A. Skubitz, Jan. 2006- Jan. 2007.
6. Institute for Engineering in Medicine, "Wearable Sensor System for Autism Assessment and Therapy," \$76,955, Jan. 2008- July 2009.
7. Institute for Engineering in Medicine, "Robotic Scrub Nurse," \$72,808, Jan. 2008-July 2009.
8. Digital Technology Center, "Enabling Research on Clinical Radiology Databases," \$27,000, Sept. 2007-May 2008.
9. Institute for Engineering in Medicine, "Automated Measurement of Distance in Nerve Conduction Studies," \$20,000, Jan. 2009- July 2009.
10. Institute for Engineering in Medicine, "Hand Disinfection Compliance Monitoring," \$10,000, Jan. 2009- July 2009.